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Chronic Splenic Anæmia and Banti's Disease.

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CHRONIC SPLENIC ANÆMIA AND BANTI'S DISEASE.

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CHRONIC SPLENIC ANÆMIA.

Definition.—Chronic splenic anæmia presents the following characters:—(i) chronic splenomegaly which cannot be correlated with any recognized cause; (ii) absence of enlargement of the lymphatic glands; (iii) chlorotic anæmia, namely, with a low colour index; (iv) absence of leucocytosis, and usually the presence of leucopenia; (v) liability to copious gastro-intestinal hæmorrhages from time to time; (vi) the prolonged course without any tendency to spontaneous cure, though splenectomy (if successful) is usually curative.

Separation of splenic anæmia from Banti's disease and other conditions.—The title Banti's disease is now often used as synonymous with splenic anæmia, even by those who fully recognize that it is a sequel or terminal stage of splenic anæmia, and does not occur in all cases, even when unduly prolonged. It is true that Banti[2] regarded splenic anæmia as the antecedent of his "splenomegaly with cirrhosis," and that it may therefore, be spoken of as the early stage of Banti's disease; but, surely, it is better to restrict the name Banti's disease to cases with hepatic cirrhosis as the sequel of chronic splenic anæmia, which this eminent physician[2] was the first to describe? As it seems highly desirable, and is perhaps not too late, to stereotype the nomenclature in this way, I shall confine my remarks on splenic anæmia to cases in which there is no reason to believe that the liver has become cirrhotic. As defined above, chronic splenic anæmia is distinct from the mere association of chronic splenomegaly and anæmia, especially from von Jaksch's anæmia pseudo-leukæmica infantum.

In the past the peculiar large-celled hyperplasia of the

spleen, or Gaucher's disease, has usually been included in chronic splenic anæmia, but its peculiar morbid lesions and, according to Brill and Mendlebaum,[6] its clinical features entitle it to a separate nosological niche. The inclusion of cases of Gaucher's disease among those of chronic splenic anæmia has vitiated some statistics, such as my own [38] in 1902, by exaggerating the average weight of the spleen and the duration of life in true splenic anæmia.

The introduction by Chauffard,[13] in 1907, of a method for estimating the fragility of the red-blood corpuscles isolated hæmolytic jaundice, which had previously been included in chronic splenic anæmia. Thus, C. Wilson's[49] cases of hereditary enlargement of the spleen have often been regarded as splenic anæmia. After the rigid exclusion of all the conditions (*vide* p. 11 *et seq.*) which may imitate chronic splenic anæmia, the remaining cases may still further be divided into (a) those which show splenic fibrosis and *fibro-adénie*, and will eventually be complicated by hepatic cirrhosis, or the third stage of Banti's disease; (b) those in which the spleen does not show these changes, and in which hepatic fibrosis does not occur even after many years. Cases which have lasted considerably longer than the first and second stages of Banti's disease (5–7 years) have been reported by Osler, Marchand, Umber, Léon-Kindberg and May,[27] and others (compare p. 11). Banti himself recorded a case of 14 years' duration when cured by splenectomy.

Pathogeny. — The cause is unknown. Blood cultures, puncture of the spleen in life, and cultures of splenic tissue have been negative, and examination of the organ after death has failed to establish any causal micro-organism.

Quite recently, A. G. Gibson[28] described appearances which he interprets as pointing to a perivascular invasion of the spleen by streptothrix organisms; cultural confirmation was not possible. Five cases were fully reported; the first had tuberculosis of the lungs and liver, a big spleen, and was diagnosed clinically as Banti's disease; the second was a case of syphilis of the liver with splenomegaly, published by Osler[34] as an example of the imitation of Banti's disease by syphilis; the third was a case of chronic mediastino-pericarditis with some splenic enlargement; the fourth was a case of chronic cardiac failure in which the spleen was not enlarged; and the last was a case of pulmonary tuberculosis with hepatic syphilis and a spleen twice the natural size. As the presence of a streptothrix, of which two varieties are described, in such different conditions throws grave doubts on its specificity, it does not appear to

be proved that splenic anæmia is due to a streptothrix infection.

The resemblance of the disease to kala-azar suggests that some micro-organism allied to *Leishmania* is responsible for the sporadic cases of the disease in this country; possibly it is ultra-microscopic. In a recent case under the care of my colleague, Dr. James Collier, smears of the excised spleen, examined by Dr. E. L. Hunt, did not show any evidence of ultra-microscopic organisms.

Since splenectomy cures the disease it is clear: (*a*) that the spleen is in some way responsible, and there is not any active hæmic infection or intoxication at work; and (*b*) that splenic inadequacy is not the cause of the anæmia. The spleen may be considered to give rise to anæmia in the following ways:—

i. By increased hæmolytic activity; this hypothesis is naturally suggested by enlargement of an organ which normally plays some part in the destruction of red-blood corpuscles. In 1902, Barr[3] suggested that splenic anæmia is due to vasomotor paralysis of the splanchnic area, caused by disease of the sympathetic; and Sutherland and Burghard[43] assumed a loss of vasomotor control in the splenic artery, leading to overfilling of the spleen with arterial blood and hyperplasia, a condition which they compared with that of the thyroid in Graves' disease. Over-activity of the spleen was thought to cause excessive hæmolysis. The enlargement, however, is not a pure hypertrophy, but is largely due to fibrosis, and such a spleen should be less functionally active than a normal one. Further, the blood changes do not resemble those of pernicious anæmia or of hæmolytic jaundice—conditions in which blood destruction is known to occur; and there is no pigmentation of the spleen or liver to support the view of increased hæmolysis in the spleen.

ii. The spleen may be the headquarters of a chronic infective or toxic process, conveyed by the blood stream and possibly derived from the alimentary tract; the poisons thus produced may cause the local changes in the spleen, and later inhibit blood formation, both erythroblastic and leucoblastic, so producing anæmia. This hypothesis has the great merit of explaining satisfactorily the subsequent appearance of hepatic cirrhosis. But there is no convincing evidence that the anæmia is due to inhibition of blood forma-

tion, for after a hæmorrhage the blood condition may steadily improve until another bleeding occurs.

(iii) Enlargement of the spleen, due to some unknown cause, may induce anæmia as the result of hæmorrhage, which is brought about mechanically. Thus, torsion of the splenic vein would divert the venous blood from the spleen into the vasa brevia, the normal blood current being reversed, and cause great dilatation of these veins and so œsophageal varices, from which copious or occult bleeding might result. This hypothesis satisfactorily explains the anæmia, but not the subsequent hepatic cirrhosis in the further stage of Banti's disease.

In conclusion, with our present knowledge it seems most reasonable to believe: (*a*) that in splenic anæmia a chronic infective or toxic process has its headquarters in the spleen, which therefore undergoes fibrotic enlargement; (*b*) that the large spleen mechanically causes gastric hæmorrhage, which is responsible for the anæmia; and (*c*) that, poisons conveyed from the spleen eventually induce cirrhosis of the liver.

Morbid Anatomy.—The spleen preserves its general outline. The surface is smooth except for thickening of the capsule, and in some cases for adhesions. The spleen is much increased in size, and there may be enlarged splenunculi in the hilum. The weight naturally varies with the patient's age. The average weight of 21 cases which I have collected was 27·6 oz., and the extremes 52 oz. in a woman aged 53 (L. B. Wilson [50]), and 8¼ oz. in a girl aged 10 years (F. Taylor [46]). The weight of the organ is therefore far less than in Gaucher's disease, in which the average weight in 13 authentic cases was 7·2 lbs. (Brill and Mandlebaum). On section, the spleen shows fibrosis, and is usually dark-red in colour.

Microscopically, according to Banti, whose description Ledingham [28] follows, the spleen shows great thickening of the trabeculæ, fibrosis and hyaline change in the Malpighian bodies, thickening and hyaline change in the reticulum of the pulp (*fibro-adénie*), and a rich lining of the endothelial cells in the blood sinuses which are not dilated, as in the spleen of portal cirrhosis; this distinction, however, Gilbert and Lereboullet [22] and others do not admit. L. B. Wilson [50] sums up the appearances as those of a primary chronic diffuse paren-

chymatous and interstitial inflammation.

The splenic vein is enlarged and tortuous; this is a natural result of the increased size of the organ and of its liability to drag on its pedicle. It often shows endarteritis and some secondary calcification, especially near its proximal end. The vasa brevia in the gastro-splenic omentum are dilated, and may be as large as the little finger. The probable explanation of this change is, that they have at certain times to convey the blood from the spleen, a reversal of the normal current of the blood, when from twisting of the pedicle of the organ the splenic vein is temporarily occluded. The veins at the lower end of the œsophagus are also frequently varicose and may be ulcerated. The bone marrow does not show any constant changes.

Incidence.—Splenic anæmia is rare. In a series of 100 cases of well-marked splenomegaly there were 4 of splenic anæmia (Cabot[10]). At the Mayo clinic between 1904 and 1912 there were 10 cases (L. B. Wilson[50]).* Dr. H. M. Turnbull has kindly informed me that at the London Hospital the spleens of 5 cases of splenic anæmia were examined in the years 1907–1913. In isolated instances (Sutherland and Burghard[43]), two members of a family have been attacked; this contrasts with the familial tendency of Gaucher's disease.

The *sex incidence* varies in different collections of cases. Thirteen out of Osler's 15 cases, and 7 out of Dock's[18] 8 cases were males; out of L. B. Wilson's 10 cases 5 were males and 5 females, so that among 33 American cases there were 25 males and 8 females. Out of 16 British cases, 5 were males and 11 females. Thus, out of a total of 49 cases, 30 were males and 19 females. As mentioned on p. 17, a collection of 50 cases of Banti's disease contained 32 females and 18 males (Banti[3]).

The *age incidence* also varies in different series. Thus in L. B. Wilson's 10 cases, in all of which splenectomy was performed, the average age was 43·3; but among 16 British cases, 9 of which underwent that operation, the average age was 15 years. In view of this early age, which is somewhat surprising, it is perhaps well to state that the blood counts of

* He gives 18 cases, but two of these he regarded as neoplastic, 3 as Gaucher's disease, and 3 had Banti's syndrome.

these cases were characteristic of splenic anæmia and did not suggest von Jaksch's anæmia pseudo-leukæmica infantum. The ages of Wilson's cases varied between 26 and 56, and of my 16 cases between 5 and 35 years.

Clinical Picture.—Symptoms usually come on gradually, and are referable to anæmia, such as weakness, shortness of breath on exertion, and debility. Less frequently, the first thing mentioned is hæmatemesis, which is generally the reason why the patient seeks advice. The cardinal features are splenomegaly, hæmorrhages, and the blood changes.

The *enlargement of the spleen* probably always precedes, sometimes for long periods, the anæmia; and the condition, if discovered in this early stage, appears to be one of simple splenomegaly. The enlargement, which is progressive, varies according to the duration of the disease; it may be very considerable, but it seldom rivals that of myeloid leukæmia, and is much less than that seen in Gaucher's disease (*vide* p. 6). It feels firm and smooth, is not tender, and may present one or more notches. In a few instances, a *bruit de diable* has been audible over the spleen[38 41], and is doubtless due to eddies produced by slight torsion of the dilated veins in the gastro-splenic omentum or of the splenic vein.

Gastro-intestinal hæmorrhage is the most serious symptom, and usually raises the question of splenectomy. It is characteristically recurrent, and may extend over many years; thus, a woman was admitted into the London Hospital 13 times in 15 years for severe hæmatemesis (Hutchison[26]). The intervals vary from weeks to many months or even years. The hæmorrhage may be enormous; in one of Osler's[32] cases (No. 2), nearly three quarts of blood were thought to have been lost in 36 hours. On the other hand, it seems probable, though not proved, that minute quantities of "occult blood" may be passed in the stools for long periods. The most obvious source of the gastric hæmorrhages is ulceration of œsophageal varices. General portal obstruction, as seen in cirrhosis, is absent, but there is local dilatation of the splenic, vasa brevia, and œsophageal veins.

As mentioned on p. 7, the large size of the vasa brevia and œsophageal veins may be explained as a result of occasional torsion of the splenic vein, and the consequent passage of the blood from the spleen into the vasa brevia veins.

Dilatation and varicosity thus induced would cause œsophageal piles, and so explain hæmorrhage. It is also possible that, when the blood from the cardiac end of the stomach is flowing in a normal manner into the splenic vein, the vasa brevia may become kinked in the gastro-splenic omentum, and, as 40 per cent. of the blood from the stomach passes in this direction, extreme gastric engorgement would follow. It must be admitted, however, that copious hæmatemesis is rare or absent in other and more extreme forms of splenic enlargement, which should equally cause torsion of the veins. In some cases, in which œsophageal varices are not forthcoming, small erosions of the gastric mucosa, due to bacterial necrosis, may perhaps be responsible ; clinically, this would seem probable when the onset of hæmatemesis is accompanied by fever.

Other hæmorrhages.—Epistaxis sometimes occurs, and in a few instances purpura has been noted. In one of Osler's[32] cases there was hæmaturia.

Blood changes.—There is anæmia of the chlorotic type, namely, with a low colour index. The number of red-blood corpuscles may drop to under 2,000,000 per c.cm. ; in an extreme case, the red blood-corpuscles fell to 1,500,000, and in another they were 1,690,400 with 15 per cent. of hæmoglobin, and a colour index of 0·4. Usually the red-blood count is about or above 50 per cent. ; in Osler's[33] 15 cases, indeed, the average was considerably higher, namely, 3,425,000 per c.cm. and the hæmoglobin 47 per cent. But the estimations naturally vary widely in the same case at different times, according as there has or has not been recent hæmorrhage.

The anæmia may be very well marked in cases without obvious hæmorrhages. Anæmia may be persistent, but usually it occurs in attacks, sometimes after a copious gastric hæmorrhage, sometimes without any history of this. Possibly, in the latter event, there has been a bleeding from œsophageal varices in such small amounts that it is not obvious to the naked eye. Observations as to the presence or absence of "occult" blood in the stools are therefore very desirable in these cases of anæmia without large hæmorrhages. This point has an important bearing on the question whether the anæmia is toxic or hæmorrhagic. After a hæmorrhage, the condition of the blood usually improves and may become normal ; in some instances, indeed, the number of red blood-corpuscles

may be more than 5,000,000 per c.cm. In a case at St. George's Hospital, the number of reds, which had been 3,200,000, went up to 6,000,000 before the fatal hæmatemesis. In cases in which the anæmia obviously depends on hæmorrhage, there is no need to invoke a toxic factor.

The leucocytes are not increased in number, except as the result of a passing complication, and sometimes after a profuse hæmorrhage. The usual condition is a leucopenia; the average of 14 of Osler's cases was 4,520. Gulland and Goodall[25] mention an extreme case with a count of 800. The cause of this leucopenia, which is also seen in tropical splenomegaly, is not known; our present knowledge hardly justifies the hypothesis that auto-leucolysins or -leucocytotoxins (which dissolve leucocytes) are produced in the spleen, by the processes responsible for the fibrotic changes there. Banti believed that, though there was no inhibition of hæmatopoiesis, the elements of the blood were not discharged into the circulation. If this were the case, surely the lymphatic glands and bone marrow would be enlarged from retained blood-cells? In some cases, there is a relative increase in the lymphocytes, but no stress can be laid on this. A few myelocytes may appear in the blood in the late stages.

Other Clinical Features.—There is no enlargement of the lymphatic glands, and the liver is not increased in size, until the condition is complicated by hepatic changes (Banti's disease). Ascites has been reported in cases without cirrhosis of the liver,[33] and is, perhaps, due to chronic perisplenitis. The urine is normal, though in the later stages it may be high-coloured. In some cases, there are attacks of colicky pain, probably due to traction and slight torsion of the peritoneal ligaments of the spleen, or to dragging on perisplenitic adhesions. In other instances, there is merely a feeling of weight or discomfort on the left side of the abdomen. Many patients, however, are so free from localizing symptoms, that the splenomegaly is unsuspected until discovered on medical examination. Gastro-intestinal disturbance and indigestion are less frequent than might be expected as a result of the embarrassment due to the large spleen. Some patients suffer from diarrhœa; this, according to Banti, occurs in the transitional stage between splenic anæmia and Banti's

disease.

The skin is usually pale, but sometimes shows pigmentation, diffuse, or localized and then confined to areas of pressure; conceivably irritation of the abdominal sympathetic by traction, exerted by the enlarged spleen, is responsible in some cases. It may be due to the medicinal use of arsenic, and this probably explained its occurrence on the abdomen only in one case which I saw. Slight jaundice is usually mentioned, but the cases, such as Claude Wilson's,[49] in which this was reported prior to 1907, when Chauffard[13] separated off the complex group of chronic hæmolytic jaundice, may have belonged to the later category. The skin of the abdomen does not show dilated veins, as in the portal obstruction due to cirrhosis. Oedema of the feet has been observed in a few cases, and may be due to cardiac dilatation. Hæmic and apical systolic murmurs are not uncommon. Peripheral neuritis does not occur. As the disease is afebrile, fever should suggest some complication or another diagnosis.

Prognosis is bad as regards recovery unless splenectomy is performed; but the disease may last for many years, though it does not rival Gaucher's disease, in which the spleen may be enlarged for 25, or even more, years (36 years in Schlangenhaufer's case). In 7 out of Osler's[83] 15 cases the duration was more than 10 years, which is considerably in excess of, if not double, the period usually occupied by the first stage of Banti's disease (*vide* p. 16). In a case under my care the spleen had been enlarged for 12 years. Repeated hæmorrhages at short intervals make the outlook very grave, as they are probably due to an ulcerated œsophageal varix. The onset of ascites usually, but not invariably, means that the liver has become cirrhotic (Banti's disease).

Diagnosis rests on the six points given on page 3. As splenic anæmia has sometimes been regarded as a syndrome, or collection of symptoms, rather than a definite disease, on the ground that various morbid conditions may produce a similar clinical picture, the differential diagnosis must be considered in some detail.

Leukæmia is easily recognized by a blood examination, but in its aleukæmic phases, in which either spontaneously or as the result of treatment the total leucocyte count

becomes nearly or quite normal, the real condition may be overlooked in the absence of a differential white count. The following case at first appeared to be one of lymphocytic leukæmia in an aleukæmic phase, but later it was indistinguishable from splenic anæmia.

A male, aged 37, had had a large abdomen since boyhood. In 1911 when otherwise well, he was accidentally found, during an attack of colic apparently caused by damsons, to have an enormous spleen. The blood shewed 3,400,000 reds, 60 per cent. hæmoglobin, colour index 1; leucocytes 3400, lymphocytes 61·2 per cent., nearly all small, mast cells 4 per cent. In January, 1912, after a long railway journey, he became very ill, and, though there was no evidence, looked as if he had lost a large quantity of blood. He also developed ascites and œdema of the feet. On January 18th, the red blood corpuscles were 788,000, the leucocytes 11,400, polymorphonuclears 9·6, lymphocytes 89·2, large hyaline cells 1·2. On January 31st, the red count was 716,000, hæmoglobin 15 per cent., colour index 1, leucocytes 7800, polymorphonuclears 14 per cent., lymphocytes 86 per cent. A week later, the red count was 656,000, hæmoglobin 16 per cent., leucocytes 3200, polymorphonuclears 23·2 per cent., lymphocytes 76·8 per cent. The patient gradually recovered, and after a course of X-rays the spleen diminished and the blood count improved, the proportion of lymphocytes becoming nearly normal.

In portal cirrhosis, the spleen is seldom so large, and the hepatic change so latent as to imitate splenic anæmia. Occasionally in old, and apparently quiescent, cirrhosis of the liver, the spleen may reach a very large size. I have seen this, which is apparently the converse of Banti's disease, on one or two occasions; and, as illustrating this, I may also refer to the case of a man who survived the Talma-Morrison operation for 2½ years with steadily increasing enlargement of the spleen, which after death weighed 48 oz. Naunyn and his followers, indeed, regard latent cirrhosis as the real explanation of splenic anæmia. In the form of biliary cirrhosis, in which splenic precedes hepatic enlargement (metasplenomegalic), there is persistent jaundice, which should distinguish it from splenic anæmia.

Chronic obstruction of the splenic vein leads to splenomegaly, recurrent gastric hæmorrhages, anæmia with a low colour index, and leucopenia—an exact imitation of splenic anæmia. The splenic vein may be (i) reduced to a fibrous cord; (ii) represented only by a plexus of veins, as in a case in which hæmatemesis occurred at intervals of 10 months for 20 years (Langdon Brown[8]); (iii) thrombosed as the result

of extensive endophlebitis (Dévé,[17] Œttinger, and Fiessinger,[30] Cauchois[11]); (iv) occluded by an organized thrombus at its proximal end, as in Bland-Sutton's[5] case, in which hæmatemesis regularly recurred whenever the red blood count reached 3,200,000 per c.cm., or (v) blocked by endophlebitic thickening and calcification near its proximal end (Dock and Warthin[19]). These various morbid changes may be different stages of the same process, but the sequence of events may vary; thus, endophlebitis may undoubtedly cause thrombosis, and it is quite possible that organization of a primary thrombus may be followed by endophlebitis and calcification.[46A] From the clinical features, a correct diagnosis can only be suspected from the history of hæmatemesis and splenomegaly shortly after injury or delivery (Rommelaere[30]). But because a case indistinguishable from splenic anæmia is found to show thrombosis of the splenic vein, it does not follow that the clinical diagnosis was wrong, as is held by the French school; for the thrombosis may be a late complication of old standing splenomegaly, and due to endophlebitis set up by the morbid processes in the spleen. On the other hand, fibrous obliteration of the splenic vein must be regarded as the cause of the splenic enlargement, hæmorrhages, and anæmia.

Syphilis of the liver and spleen may closely imitate splenic anæmia. Coupland[14] mentions a woman whose spleen was removed with great benefit for supposed splenic anæmia, but at her death, two years later, from gastro-intestinal hæmorrhage and ascites, a syphilitic liver was found. Somewhat similar cases have been recorded. Much of the interest and uncertainty in the diagnosis beween splenic anæmia and syphilis has now been dissipated by the Wassermann reaction.

Gastric ulcer may be suggested when a patient with copious hæmatemesis first comes under observation, but the discovery of a large spleen should correct this. In the following unusual case, the converse mistake was made:—

Some years ago a middle-aged man, very anæmic, and with a history of recurrent hæmatemesis, was under my care in St. George's Hospital. There was a tumour which appeared to be an enlarged spleen, and the condition was regarded as splenic anæmia. The necropsy showed that the tumour was a large hydatid cyst in the left kidney, and that a chronic gastric ulcer was responsible for the repeated hæmatemesis.

Massive tuberculosis of the spleen, in which there is

considerable enlargement without any very obvious evidence of infection elsewhere, is rare. Winternitz[61] has collected 50 cases.* It may imitate splenic anæmia, from which it may be distinguished by the greater prominence of splenic pain, and by enlargement of the lymphatic glands and liver. The diagnosis, however, is not of vital importance, for unless splenectomy is performed, the disease generalizes and proves fatal. Of the cases operated upon, 59 per cent. recovered.[51]

In generalized lymphadenoma, the spleen is often moderately enlarged; and in rare instances the superficial lymphatic glands may diminish in size as the spleen enlarges, but there is hardly ever complete absence of palpable, enlarged glands. In two cases, which must have closely resembled splenic anæmia (Symmers,[44] Wade[47]), the excised spleen appeared to be the only site of lymphadenoma, but in neither of these cases was a necropsy obtained.

Subacute malignant endocarditis may produce anæmia, leucopenia, and a large spleen, and thus simulate splenic anæmia (Parkes Weber,[48] Osler,[84] and Libman[28]). The cardiac murmurs may be regarded as accidental, and, as Libman has shown, there may be bacteria-free periods so that blood cultures may be negative. Persistent albuminuria or hæmaturia is strongly in favour of infective endocarditis.

The clinical feature of Gaucher's disease, according to Brill and Mendlebaum,[6] who consider them so distinctive as to establish the diagnosis from splenic anæmia, are as follows:— Incidence in childhood usually before the age of 12 years, and its familial but not hereditary occurrence; progressive splenomegaly which may become enormous, and is followed by a similar huge enlargement of the liver; a characteristic brownish-yellow pigmentation usually confined to the face, neck, and hands; peculiar, yellow, wedge-shaped thickenings of the conjunctivæ, usually on both sides of the cornea; late in the disease, hæmorrhages from the nose and gums and into the skin occur on slight provocation; from the outset there is leucopenia, but the red blood count is normal until late in the disease, when chlorotic anæmia appears; its prolonged course.

Chronic splenomegalic hæmolytic jaundice resembles splenic

* He tabulated 51 cases, but 1 was W. Collier's case of Gaucher's disease.

anæmia in the chronic splenomegaly, and in the acquired cases by the presence of anæmia. In the hereditary and congenital cases of hæmolytic jaundice, the subjects—for they are not patients—often do not present any signs or symptoms except acholuric jaundice and splenomegaly, and their lives are not necessarily shortened thereby. The outlook is therefore very different from that in splenic anæmia, in which really persistent jaundice is so rare that its occurrence should lead to examination of the red corpuscles for increased fragility.

I do not know if splenic anæmia has ever been recognized in the subject of transposition of the viscera, but the diagnosis in such a case might be very difficult.

Treatment.—Medical treatment consists in good hygienic conditions, the administration of iron and arsenic, and recently the intravenous injection of salvarsan, which has been stated to give good results. Exposure of the splenic region to X-rays has also been said to be followed by diminution in the size of the organ, but it has not been proved that the benefit is permanent.

Splenectomy appears to be the only form of treatment of real value. Extensive adhesions may make the operation very difficult, and there is some risk of severe or fatal post-operative hæmorrhage. The question of splenectomy in any given case is therefore an anxious problem; if left alone, the patient will eventually die, whereas operation will cure or kill at once. There are numerous statistics bearing on the results of splenectomy, but some impartially include cases of Banti's disease, Gaucher's disease, simple splenomegaly, and splenic anæmia, and therefore will not be quoted. Banti[3] stated that splenectomy in the first stage of "splenomegaly with cirrhosis" (which is splenic anæmia) was attended by a mortality of 12·5 per cent., and Rodman and Willard,[37] though not dealing with the same cases, come to a similar conclusion.

Mr. H. S. Souttar has suggested to me that the risks of laparotomy and splenectomy might be avoided and good results obtained by inserting a tube of radium, by means of a specially constructed trocar, directly through the abdominal wall into the substance of the spleen.

BANTI'S DISEASE.

Since 1894, when he first described "splenomegaly with cirrhosis" as a definite disease,[2] Banti has several times elaborated and defended his thesis. The following is a summary of Banti's conception of the disease which goes by his name, and of which he has now studied 50 cases.[3] There are three stages:—(i) The pre-ascitic, characterized by splenomegaly, without enlargement of the lymphatic glands or much alteration in the general health. There may or may not be anæmia, and at any rate the splenomegaly precedes the anæmia. This stage usually lasts 3 to 5 years, but may be longer, as the splenomegaly is generally considerable when the patient first comes under observation. (ii) The intermediate or transitional stage shows definite though moderate anæmia, leucopenia with relative increase of the mononuclear leucocytes, and a low colour index. The skin is pale and at times slightly icteric, and the liver somewhat enlarged. The urine is scanty and high-coloured. The general health is impaired, and gastro-intestinal disturbance, especially diarrhœa, and sometimes piles appear. This stage lasts from 12 to 18 months. (iii) In this stage, which may rightly be called Banti's disease, ascites appears, the liver is cirrhotic and gets smaller, the general health fails, the patient wastes, and gastro-intestinal and other hæmorrhages occur; in short, the picture of ordinary cirrhosis. This stage is often short, a few months to a year.

This division into three stages is perhaps too sharp, and the first two stages especially run into each other. Its claim to be regarded as a disease, namely as a definite and constant sequence of pathological events not due to any other recognized cause, with a correlated group of clinical manifestations, has been much discussed and contested. Gilbert and Lereboullet,[22] and others deny its existence except as a syndrome, or group of symptoms, which may be produced by several different morbid changes. Undoubtedly, some conditions, such as cirrhosis, syphilis of the spleen and liver, and thrombosis of the splenic and portal veins, may almost exactly imitate it, but it appears to me that it is impossible to deny the existence of cases corresponding more or less accurately to those described by Banti, in which no other causal factor

is forthcoming. It is, perhaps, worth mentioning that Oettinger, who in 1907 reported two cases resembling Banti's disease, but due to endophlebitis and thrombosis of the splenic vein,[30] in 1911 fully recorded a case which he frankly admitted[31] agreed with Banti's description.

Morbid Anatomy.—The morbid anatomy is that of splenic anæmia (*see* p. 6), with the addition of multilobular cirrhosis of the liver.

Incidence.—The disease appears to be more frequent in Italy than elsewhere, partly from Banti's influence, and partly perhaps because malarial splenomegalies may sometimes pass muster under this title. In England, it is more often diagnosed in the wards than seen in the post-mortem room. With all the material available at the Pathological Institute of the London Hospital, Dr. H. M. Turnbull found five cases only during the years 1907–1913, which could be regarded as Banti's disease.

Ætiology.—Sex. From his experience of 50 cases Banti[3] finds that it is commoner in females (32) than in males (18), and that more than one case never occurs in the same family. The statistics of the sex incidence of splenic anæmia, which is the antecedent condition, are given on p. 7.

Age.—Out of Banti's 50 cases, 43 were between the ages of 15 and 45 years.

Pathogeny.—Banti considered that micro-organisms or toxins derived from the blood produced changes in the spleen—fibrosis beginning in the centre of the Malpighian bodies and spreading to the pulp—which caused anæmia, and subsequently set up endophlebitis of the splenic and portal veins, and cirrhosis of the liver. The hypothesis that poisons manufactured in the spleen may set up secondary changes in the liver, was supported by Chauffard,[12] who instanced malaria and argued that cirrhosis may in some cases be of splenic origin.

On the basis of injection experiments with methylene blue, Sérégé[40] concluded that the blood from the spleen goes exclusively to the left lobe of the liver; hepatic cirrhosis due to poisons manufactured in the spleen should therefore be confined to, or mainly present in, the left lobe. There is very little evidence from human pathology in favour of this. In a case of splenomegaly of 10 years' duration, in which the splenic vein was obliterated, Tansini and Morone[45] found that cirrhosis was almost confined

to the left lobe of the liver.

The suggestion that the cirrhosis is due to arsenic given medicinally for anæmia (Broadbent[7]), can apply to those cases only which had been vigorously treated.

The Clinical Features have already (p. 16) been given and need not be repeated.

Diagnosis.—Diagnosis is only possible in the third stage, and then only after the exclusion of other conditions, such as hepatic cirrhosis with a large spleen, syphilitic splenomegaly and hepatomegaly, thrombosis of the splenic and portal vein, kala-azar. In the first, and often in the second, stage, the diagnosis must be made from the various conditions with which splenic anæmia may be confused (*vide* p. 11).

Portal cirrhosis exactly resembles Banti's disease, which can only be diagnosed by the history of long-standing splenomegaly and anæmia. The Egyptian splenomegaly studied by Day and Richards[15] presents progressive hepatic cirrhosis, splenomegaly, and anæmia, and so far the condition resembles Banti's disease ; but there is fever, and hepatic cirrhosis instead of being a terminal feature is an essential part of the disease from the start (Richards[30]). But it is noteworthy that splenectomy in the early stages, before the onset of ascites, arrests the course of the disease.

Syphilis of the spleen and liver may produce the picture of Banti's disease, as has recently been emphasized by Osler[34] ; but the diagnosis can rapidly be decided by the Wassermann reaction. Thrombosis of the splenic and portal vein is as difficult or impossible to distinguish from Banti's disease, as it is from splenic anæmia (*vide* p. 12). Kala-azar can be recognized by the presence of *Leishmania* in the blood obtained by puncture of the spleen or liver.

Treatment.—Treatment is on the same lines as in splenic anæmia ; but splenectomy, which gives the only chance of recovery, is attended with a much higher mortality than in splenic anæmia. Banti estimates the operative mortality at 50 per cent., and Rodman and Willard[37] (1913) state that in the last four year 16 cases of true Banti's disease have been operated upon with a mortality of 9, or 56·25 per cent. Stein[42] quotes Rehling's optimistic estimate of a mortality

of 8 per cent. in 70 cases. The combined procedure of splenectomy and the Talma-Morrison operation has been advocated for these cases (Tansini and Morone[45]).

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